

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371U.S. APPLICATION NO. (If known, give 37 CFR 1.5)
10/088368INTERNATIONAL APPLICATION NO.
PCT/IB00/01371INTERNATIONAL FILING DATE
September 12, 2000PRIORITY DATE CLAIMED
September 14, 1999TITLE OF INVENTION **BALANCING NETWORK**APPLICANT(S) FOR DO/EO/US **Stefan KERN and Gregor GERHARD**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371 (f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☒ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information: **Receipt Acknowledgement Postcard**

Reg. No. 27,564

Rec'd PCT/PTO 07 AUG 2002

Docket No.: P/63012

#5/a

PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as Express Mail No. EL 337 912 556 US in an envelope addressed to: Box. PCT, Commissioner of Patents and Trademarks, Washington, D.C., 20231, on:
August 7, 2002
(date)
Alan Israel
Reg. No. 27,564

International Application No.: PCT/IB00/01371
International Filing Date : September 12, 2000
In re: Application of : Stefan KERN, et al.
Serial No. : 10/088,368
Deposited : March 14, 2002
For : BALANCING NETWORK

New York, New York
August 7, 2002

PRELIMINARY AMENDMENT

BOX: PCT
Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Prior to calculation of the filing fee and before examination, kindly amend the above captioned application as follows:

IN THE CLAIMS:

Please cancel claims 1-5, without prejudice.

Please add the new set of claims 6-10 as set forth on the enclosed pages.

IN THE ABSTRACT:

Delete the "Abstract" on the PCT cover sheet and replace it with the "Abstract of the Disclosure" set forth on a separate sheet attached hereto.

REMARKS

An abstract has been provided on a separate sheet; and the claims have been amended to conform to U.S. practice.

Accompanying this communication is a literal English translation of the above identified application, and the fee of \$130.00 as set forth under 37 C.F.R. §1.492(f). The undersigned attorney asks that the English translation be used as the copy for examination purposes as required under 37 C.F.R. §1.52.

If there are any additional charges, or any overpayment, in connection with the filing of this Communication, the Commissioner is hereby authorized to charge any such deficiency, or credit any such overpayment, to Deposit Account No. 11-1145.

Wherefore, an early action on the merits is earnestly solicited.

Respectfully submitted,

KIRSCHSTEIN, OTTINGER, ISRAEL & SCHIFFMILLER, P.C.

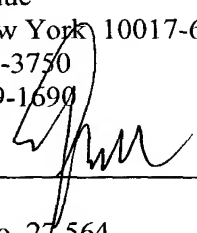
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ABSTRACT OF THE DISCLOSURE

A balancing network has three planar lines which are coupled together. One end of the first line which runs between the second and the third line acts as an unbalanced gate. The opposite end of the first line is connected to earth, and one end of each of the other two lines forms a balanced gate. The balancing network is decoupled from the direct current source. The ends of the second and third lines, which do not act as gates, are capacitively coupled with one another.

NEW CLAIMS

6. A balun, comprising: a plurality of planar lines coupled to each other, one end of a first of the lines running between a second of the lines and a third of the lines serving as an unbalanced gate, the other end of the first line being connected to ground, one end of each of the second and third lines serving as a balanced gate, and the other ends of the second and third lines, not serving as gates, being capacitively coupled to each other.

7. The balun according to claim 6, wherein, for capacitive coupling, the other ends of the second and third lines are connected to line sections that run next to each other over a stipulated length.

8. The balun according to claim 6, wherein, for capacitive coupling, the other ends of the second and third lines are connected to each other via at least one capacitor.

9. The balun according to claim 6, and a capacitor connected in series to the third line.

10. The balun according to claim 6, wherein the first, second and third lines coupled to each other have a coupling length of about one-fourth of an average operating wavelength of the balun.

**(12) INTERNATIONAL APPLICATION PUBLISHED PURSUANT TO THE PATENT
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PCT

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2000

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(81) Treaty nations (*national*): AE, AG, AL,
AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ,
CA, CH, CN, CR, CU

(*continued on next page*))

(54) Title: BALUN

(57) English Abstract: //insert//

Balun

Prior art

The present invention concerns a balun, consisting of planar lines coupled to each other, in which one end of a first line running between a second and a third line serves as unbalanced signal input and the other end of this first line is contacted with ground and one end each of the other two lines forms a balanced signal input.

Baluns are known to represent transitions between balanced and unbalanced transmission lines. A balanced line exists when the signal transmitted over it does not have ground as reference potential. On the other hand, an unbalanced transmission line is in contact with ground on one side, so that a signal transmitted over it has ground as reference potential. Baluns of this type are used, for example, at the inputs and outputs of quadruplex mixers or amplifiers or modulators, etc. A balun, consisting of three coupled planar lines, is known, for example, from J. Villemazet, J. Dubouloy, M. Soulard, J. Cayrou, E. Husse, B. Cogo, J. Cazaus: New Compact Double Balanced Monolithic Down-Converter Application to a Single Chip MMIC Receiver for Satellite Equipment, IEEE MTT-S Digest, 1998, pages 853-856. An unbalanced gate is situated on one end of the middle of the three lines. The other end of the middle line is connected to ground. The end of one of the two outer lines lying next to this line end in contact with ground is also in contact with ground, and its other end forms a balanced gate. One end of the other outer line is also in contact with ground, and the other end forms a second balanced gate. In this known balun, three line ends must be contacted with ground, for which purpose several contacts must be provided on a substrate carrying the line, which require relatively much space on the substrate. In order for the inputs of the balun not to be DC short-circuited relative to ground, capacitances must be inserted at all inputs for DC decoupling.

The underlying task of the invention is to provide a balun of the type just mentioned, in which DC decoupling is accomplished with the simplest possible means.

Advantages of the Invention

The mentioned task is solved with the features of Claim 1, in that, of the three planar lines connected to each other, one end of a first line running between a second and a third line serves as unbalanced gate and the other end of this first line is contacted with ground, and one end each of the other lines forms a balanced gate. DC decoupling is achieved by the fact that the ends of the second and third lines not serving as gates are capacitively coupled to each other.

As can be deduced from the subclaims, capacitive coupling of the line end can be accomplished very simply by the fact that the ends of the second and third lines are connected to line sections that run next to each other over a stipulated length, or by the fact that the ends of the second and third lines are connected to each other via one or more capacitors. It is expedient to connect a capacitor in series with the third line. This capacitor improves the balance between the balanced gates. It serves to balance the phase difference at 180°.

Drawing

The invention is now further explained with reference to two practical examples depicted in the drawing. In the drawing:

Figure 1 shows a balun, in which two lines are capacitively coupled to each other by parallel guiding, and Figure 2 shows a balun, in which two lines are coupled to each other via concentrated capacitors.

Description of Practical Examples

The balun depicted in Figure 1 consists of three planar lines 1, 2 and 3 running next to each other and coupled to each other. The coupling length of these three lines corresponds to about one-fourth of the average operating wavelength of the balun. The first line 1, which runs between the two other lines 2 and 3, is contacted with ground on one end. For this purpose, a contact 4 to the ground surface is provided on the bottom of the substrate on which the lines are applied. The opposite end of this first line 1 forms an unbalanced gate 5. The end of the second line 2 adjacent to this unbalanced gate 5 is a first gate for balanced signals, and the second gate 7 for

balanced signals is situated on the end of the third line 3 that is adjacent to the ground connection of the first line 1.

The connection between the ground-contacted end of the first line 1 to contact 4 occurs via an air gap 8 that spans the end of the third line 3 without contact. The ends of the second line 2 and the third line 3 opposite gates 6 and 7 are each connected to a line section 9, 10. The line sections 9 and 10 that are adjacent to each other at opposite ends of the two lines 2 and 3 are returned in space-saving fashion to the center of the balun and run next to each other over a stipulated length, in which they cross the three lines 1, 2, 3 via air gaps 11 and 12 without contact. The coupling length of the two line sections 9 and 10 is chosen so that a desired capacitive coupling is produced between the ends of the two lines 2 and 3. This capacitive coupling of the two lines 2 and 3 means that the balun is DC-decoupled.

As shown in Figure 1, a capacitor C1 is connected in series to the third line 3 in the region of gate 7. This capacitor C1 improves the balance between the balanced gates 6 and 7. It serves to balance the phase difference between the two gates 6 and 7 at 180°.

A balun is depicted in Figure 2 that has essentially the same design as the balun of Figure 1 and therefore also the same reference numbers. The practical examples of a balun depicted in Figures 1 and 2 differ in the type of capacitive coupling between the ends of the two lines 2 and 3. Whereas, according to the practical example in Figure 1, capacitive coupling occurs via a line coupling between line sections 9 and 10, in the balun according to Fig. 2 the two line sections 9 and 10 are connected to each other via two capacitors C2 and C3, designed as concentrated components. The two capacitors C2 and C3, connected to the ends of the line sections 9 and 10, which are arranged on both sides of the lines 1, 2 and 3 coupled to each other, are connected to each other via an air gap 13 that crosses the three lines 1, 2, and 3 without contact. Instead of two capacitors, only one capacitor can also be inserted between the line sections 9 and 10.

Claims

1. Balun, consisting of planar lines (1, 2, 3) coupled to each other, in which one end of a first line (1) running between a second line (2) and a third line (3) serves as unbalanced gate (5), and the other end of this first line (1) is contacted with ground (4), and one end each of the first two lines (2, 3) forms a balanced gate (6, 7), characterized by the fact that the ends of the second (2) and third (3) lines not serving as gates are capacitively coupled to each other.
2. Balun according to Claim 1, characterized by the fact that, for capacitive coupling, the ends of the second line (2) and third line (3) are connected to line sections (9, 10) that run next to each other over a stipulated length.
3. Balun according to Claim 1, characterized by the fact that, for capacitive coupling, the ends of the second line (2) and the third line (3) are connected to each other via one or more capacitors (C2, C3).
4. Balun according to Claim 1, characterized by the fact that a capacitor (C1) is connected in series to the third one (3).
5. Balun according to Claim 1, characterized by the fact that the three lines (1, 2, 3) coupled to each other have a coupling length of about one-fourth the average operating wavelength of the balun.

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro



(43) Internationales Veröffentlichungsdatum
22. März 2001 (22.03.2001)

PCT

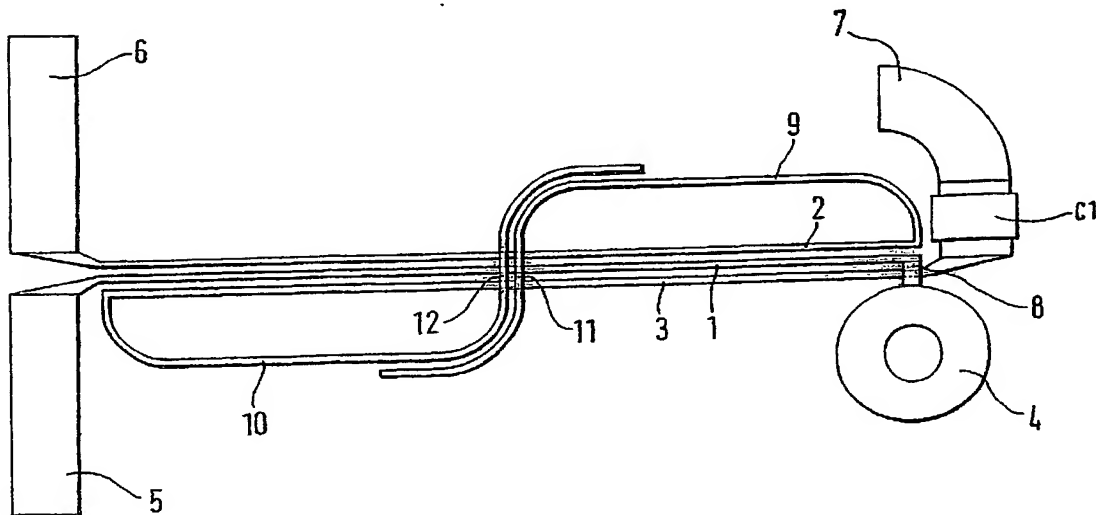
(10) Internationale Veröffentlichungsnummer
WO 01/20709 A1

- (51) Internationale Patentklassifikation: **H01P 5/10** (71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): **MARCONI COMMUNICATIONS GMBH** [DE/DE]; Gerberstrasse 33, 71522 Backnang (DE).
- (21) Internationales Aktenzeichen: PCT/IB00/01371
- (22) Internationales Anmeldedatum: 12. September 2000 (12.09.2000)
- (25) Einreichungssprache: Deutsch
- (26) Veröffentlichungssprache: Deutsch
- (30) Angaben zur Priorität: 199 43 954.0 14. September 1999 (14.09.1999) DE
- (72) Erfinder; und
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- (81) Bestimmungsstaaten (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU,

[Fortsetzung auf der nächsten Seite]

(54) Title: **BALANCING NETWORK**

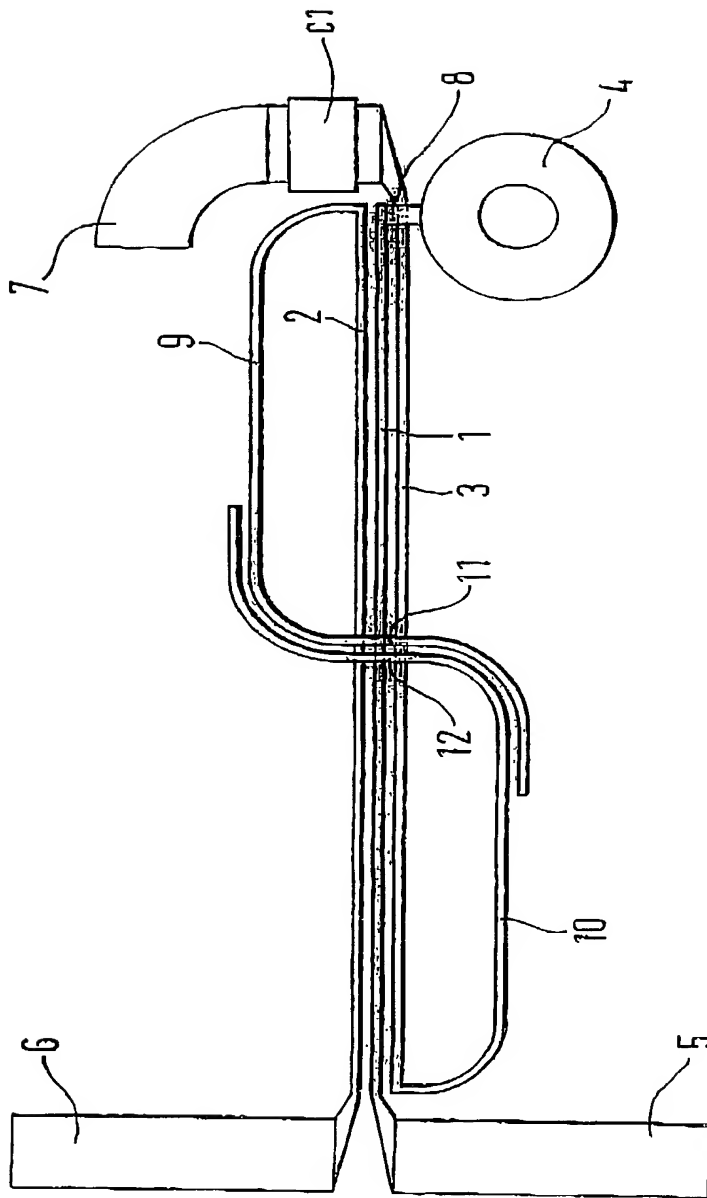
(54) Bezeichnung: **SYMMETRIERGLIED**



(57) Abstract: The invention relates to a balancing network, consisting of three planar lines (1, 2, 3) which are coupled together. One end of a first (1) line which runs between the second (2) and the third line (3) acts as an unbalanced gate (5). The opposite end of said first line (1) is connected to earth (4) and one end of each of the other two lines (2, 3) forms a balanced gate (6, 7). So that the balancing network is decoupled from the direct current source, the ends of the second (2) and third (3) line, which do not act as gates, are capacitively coupled with one another.

(57) Zusammenfassung: Das Symmetrierglied besteht aus drei miteinander gekoppelten planaren Leitungen (1, 2, 3). Ein Ende einer ersten (1), zwischen der zweiten (2) und der dritten (3) verlaufenden Leitung dient als unsymmetrisches Tor (5). Das andere Ende dieser ersten Leitung (1) ist mit Masse (4) kontaktiert, und jeweils ein Ende der anderen beiden Leitungen (2, 3) bildet ein symmetrisches Tor (6, 7). Damit das Symmetrierglied gleichspannungs-entkoppelt ist, sind von der zweiten (2) und der dritten (3) Leitung die nicht als Tore dienenden Enden kapazitiv miteinander gekoppelt.

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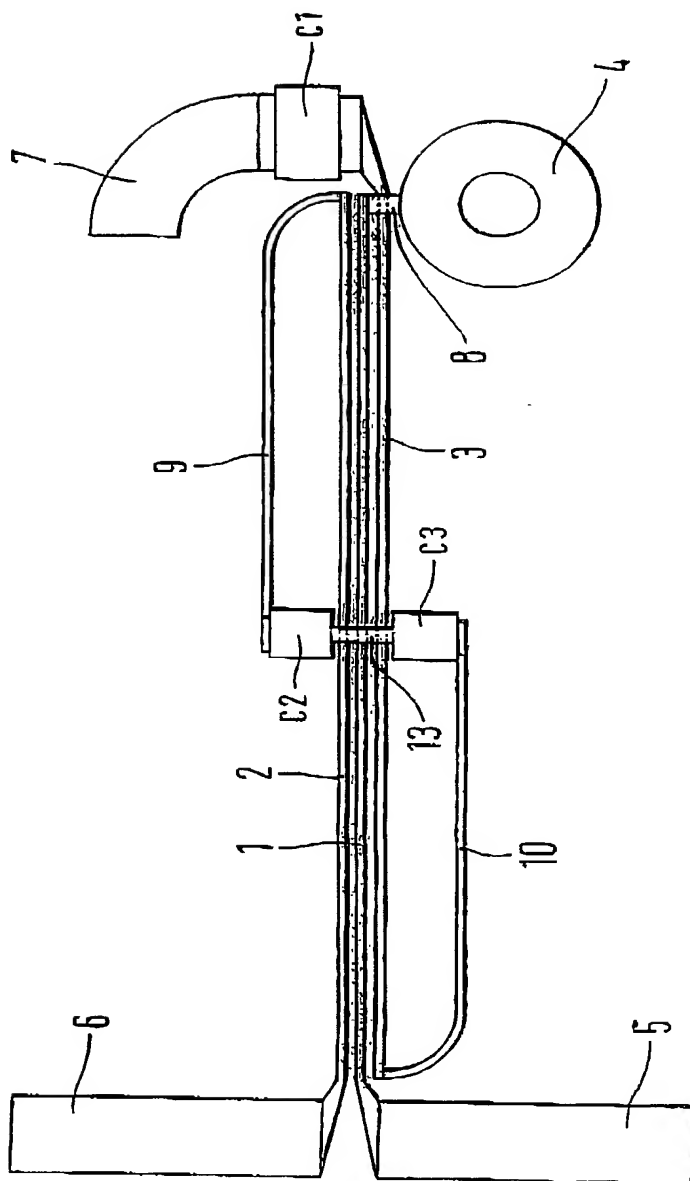


FIG. 2

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Approved for use through 8/30/98
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

PTO/SB/01 (6-95)
OMB 0651-0032

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION <input type="checkbox"/> Declaration Submitted with Initial Filing OR <input checked="" type="checkbox"/> Declaration Submitted after Initial Filing	0010/PTO Rev. 6/95	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket Number	P/63012
			First Named Inventor	KERN, STEFAN
	COMPLETE IF KNOWN			
			Application Number	10/088,368
			Filing Date	MARCH 14, 2002
			Group Art Unit	
			Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

BALANCING NETWORK

(Title of the invention)

the specification of which

☐ is attached hereto
OR

☒ was filed on (MM/DD/YYYY)

MARCH 14, 2002

as United States Application Number or PCT International

Application Number

10/088,368

and was amended on (MM/DD/YYYY)

(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code §119 (a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365 (a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
19943954.0	Germany	September 14 1999	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
PCT/IB00/01371	INTERNATIONAL	Sept. 12, 2000			

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto.

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

Burden Hour Statement: This form is estimated to take .4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

Type a plus sign (+) inside this box → ☐

DECLARATION

Page 2

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority sheet attached hereto.

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

☐ Firm Name Customer Number or label
OR
☒ List attorney(s) and/or agent(s) name and registration number below:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's Signature X Stefan K Date 5 APRIL 2002

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☒ Additional inventors are being named on supplemental sheet(s) attached hereto

Type a plus sign (+) inside this box → ☐

DECLARATION

ADDITIONAL INVENTOR(S) Supplemental Sheet

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☐ A petition has been filed for this unsigned inventor

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200

+